

Penang Sangam High School
P.O. Box 44, Rakiraki
Year 13 Agriculture Lesson Notes Week 7

Strand	AS 13.3 Agronomy
Sub-Strand	AS 13.3.1: Soils
Content Learning Outcome	AS 13.3.1.1 Demonstrate the assessment methods in determining the chemical properties of the soil.

Lesson 1: Introduction

Lesson Outcome: At the end of this lesson student should be able to identify the chemical properties of the soil.

Soil - is a mixture of minerals, organic matter, gases, liquids and organisms that support plant growth.

Chemical properties of soils can be described as soil:

❖ nutrients	❖ air	❖ cation exchange capacity
❖ water	❖ pH	❖ buffer capacity

Lesson 2: Soil Nutrients

Lesson Outcome: At the end of this lesson student should be able to:

1. differentiate between a minor and a major nutrient
2. explain the function of the different micro and macro nutrients in soil
3. explain the difference between a mobile and an immobile nutrient.

1. Nutrient - substance that provides nourishment essential for growth and life

There are 18 elements known as essential nutrients for plants. The 3 nutrients derived from the atmosphere are carbon, hydrogen and oxygen and the other remaining nutrients are derived from the soil.

There are two types of nutrients needed by the plants, major and minor nutrients.

1. <u>Macronutrients</u> - needed by plants in relatively large amounts namely N, P, K, Ca, Mg & S.	2. <u>Micronutrients</u> - required by plants in small amounts eg. B, Fe, Mn, Cu, Zn, Mo
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The micro nutrients work “behind the scene” as activators of many plant functions.

Nutrients also have variable degrees of mobility in the plant.

1. <u>Mobile nutrients</u> - nutrients that can move from one place to another inside the soil and plant where it is needed or can be translocated e.g. nitrogen. [N will leach easily].	2. <u>Immobile nutrients</u> - nutrients that cannot move from one place to another inside the soil and plant or cannot be translocated e.g. phosphorus. [P is less likely to runoff].
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1. Discuss why soil scientists study soil chemistry.

Macro-nutrients and their Functions

Nutrient	Function
Nitrogen	<ul style="list-style-type: none"> ✓ Needed for all of the enzymatic reactions in a plant ✓ Major part of chlorophyll molecule and is therefore necessary for photosynthesis

	<ul style="list-style-type: none"> ✓ Improves quality & quantity of dry matter in vegetables & protein in grain crops
Phosphorous	<ul style="list-style-type: none"> ✓ Required by cells, such as shoots and root tips for metabolism and cell division ✓ Aids in root development, flower initiation, and seed and fruit development ✓ Reduces disease incidence in some plants and improves quality of certain crops
Potassium	<ul style="list-style-type: none"> ✓ Involved in protein synthesis ✓ Improves disease resistance in plants ✓ Improves the size of grains and seeds
Calcium	<ul style="list-style-type: none"> ✓ Formation of cell wall membrane ✓ Essential for seed production in peanuts ✓ Assists in improving crop yields by reducing soil acidity when soils are limed
Magnesium	<ul style="list-style-type: none"> ✓ Major constituent of chlorophyll molecule so actively involved in photosynthesis ✓ Stabilize ribosome particles and also helps stabilize the structure of nucleic acids ✓ Assists the movement of sugars within a plant
Sulphur	<ul style="list-style-type: none"> ✓ Essential in forming plant proteins because it is a constituent of amino acids ✓ Seed production, chlorophyll formation and nodule formation in legumes ✓ Stabilizes protein structure

Micro-nutrients and their Functions

Nutrient	Function
Iron	<ul style="list-style-type: none"> ✓ Essential in synthesis and maintenance of chlorophyll in plants ✓ Associated with protein metabolism
Manganese	<ul style="list-style-type: none"> ✓ Part of the plant enzyme system, activating several metabolic functions ✓ Involved in photosynthesis
Copper	<ul style="list-style-type: none"> ✓ Essential in several plant enzyme systems involved in photosynthesis ✓ Synthesis and/or stability of chlorophyll and other plant pigments
Zinc	<ul style="list-style-type: none"> ✓ Ribose Nucleic Acid (RNA) and protein synthesis
Boron	<ul style="list-style-type: none"> ✓ Promote root growth and pollen germination ✓ Seed and cell wall formation, and sugar transport
Molybdenum	<ul style="list-style-type: none"> ✓ Normal assimilation of Nitrogen ✓ Required by some soil micro-organisms for nitrogen fixation in soils

1. Discuss why farmers are advised not to apply fertilizing materials before heavy rain.

2. Explain how plants obtain their nutrients when grown in a hydroponic system.
